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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,044	10/03/2003	Tadahiro Ishizaka	010986.52820US	6657

23911 7590 03/13/2006

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EXAMINER	
LUND, JEFFRIE ROBERT	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 03/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/678,044	**Applicant(s)** ISHIZAKA ET AL.	
	Examiner Jeffrie R. Lund	**Art Unit** 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.
2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☐ Claim(s) _____ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, and 3-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamaga et al, US Patent 5,484,484.

Yamaga et al teaches a processing apparatus that alternately supplies a first gas and a second gas, and includes: processing container 2 in which a substrate W is placed; a first gas supply system 4 including a stop valve V1; a second gas supply system 6 including a stop valve V3; a third gas supply system 140A for supplying nitrogen to the processing apparatus; a first exhaust system 5 including a stop valve V2; a second exhaust system 7 including a stop valve V4 and a scrubber to trap reaction by-products; and a controller 20 for controlling the valves in the first and second supply and exhaust systems to synchronize the switch between the first gas supply system and first exhaust system, and the second gas supply system and the second exhaust system. The second gas exhaust system is closed by valve V4 (V2) while the first system is in operation and vice versa. (Entire document, specifically, Figure 1) The specific process performed by the apparatus is an intended use of the apparatus. The apparatus of Yamaga et al is capable of performing an atomic layer deposition.

3. Claims 1, and 3-5 are rejected under 35 U.S.C. 102(b) as being anticipated by

Saito et al, US Patent 6,383,300 B1.

Saito et al teaches a processing apparatus that alternately supplies a first gas and a second gas, and includes: processing container 12 in which a substrate 15 is placed; a first gas supply system 35a including a stop valve VB1; a second gas supply system 35c including a stop valve VB5; a third gas supply system 36a, 36b for supplying nitrogen to the processing apparatus; a first exhaust system 71 including a trap 73; a second exhaust system 72 including a trap 74; and a controller 75 for controlling the valves in the first and second supply and exhaust systems to synchronize the switch between the first gas supply system and first exhaust system, and the second gas supply system and the second exhaust system. The second gas exhaust system is closed by valve 69 while the first system is in operation and vice versa. (Entire document, specifically, Figure 1) The specific process performed by the apparatus is an intended use of the apparatus. The apparatus of Saito et al is capable of performing an atomic layer deposition.

4. Claims 1, and 3-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Shinriki et al, WO 02/15243 A1.

Shinriki et al teaches a processing apparatus that alternately supplies a first gas and a second gas, and includes: processing container 11 in which a substrate 12 is placed; a first gas supply system 20A, 20C including a stop valve 19A, 19C; a second gas supply system 20B including a stop valve 19B; a third gas supply system 23A, 23B, 23C for supplying argon to the processing apparatus; a first exhaust system 14A including a stop valve 15A; a second exhaust system 14B including a stop valve 15B;

and a trap 100 trap to trap reaction by-products; and a controller 10A for controlling the valves in the first and second supply and exhaust systems to synchronize the switch between the first gas supply system and first exhaust system, and the second gas supply system and the second exhaust system. The second exhaust system is closed by valve 15B (15A) while the first system is in operation and vice versa. (Entire document, specifically, Figure 1)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaga et al, US Patent 5,484,484, in view of Sekine et al, US Patent 6,334,938 B1.

Yamaga et al was discussed above.

Yamaga et al differs from the present invention in that Yamaga et al does not teach that the first exhaust system has a trap for trapping the first precursor and a recovery pipe for returning the trapped first precursor to the first supply system, or using three-way valves in the supply and exhaust systems.

Sekine et al teaches a trap 6 and recovery line 19 for trapping a precursor and returning it to the supply system, and three-way valves 26a-26d connected to supply lines 3, 10 prior to the coolers 27a, 27b and exhaust lines 3,10 after the coolers 27a, 27b for directing and controlling the flow of gas from the TMP 4 and compressor 9 to the dry pump 5 and gas separator 11. (Entire document, specifically, figures 5 and 8)

The motivation for adding the trap and recovery line of Sekine et al to the first exhaust system of Yamaga et al is to enable the apparatus of Yamaga et al to trap and recycle the unused first precursors to improve the efficiency of process and lessen the environmental impact of the process gases as taught by Sekine et al.

The motivation for replacing multiple (two) stop valves of Yamaga et al with a single three-way valve of Sekine et al is to provide an alternate and equivalent means of controlling the flow of gases, and to simplify the supply and exhaust systems.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the trap and recovery pipe of Sekine et al to the first exhaust system of Yamaga et al and to replace the stop valves of Yamaga et al with a three-way valve of Sekine et al as taught by Sekine et al.

7. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaga et al, US Patent 5,484,484, in view of Otsuki, US Patent Application Publication 2003/0200929 A1.

Yamaga et al was discussed above.

Yamaga et al differs from the present invention in that Yamaga et al does not teach $TiCl_4$ and NH_3 as the first and second precursors.

Otsuki teaches a processing system that includes a first precursor supply system 44 for supplying $TiCl_4$ and a second precursor supply system 45 for supplying NH_3 to form a barrier layer of TiN. (Figure 1)

The motivation for using $TiCl_4$ and NH_3 as the first and second precursors in the apparatus of Yamaga et al is to enable the apparatus of Yamaga et al to deposit a TiN barrier layer as taught by Otsuki.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use $TiCl_4$ and NH_3 as precursors in the apparatus of Yamaga et al as taught by Otsuki.

8. Claims 2, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al, US Patent 6,383,300 B1, in view of Sekine et al, US Patent 6,334,938 B1.

Saito et al was discussed above.

Saito et al differs from the present invention in that Saito et al does not teach that the first exhaust system has a trap for trapping the first precursor and a recovery pipe for returning the trapped first precursor to the first supply system, or using three-way valves in the supply and exhaust systems.

Sekine et al teaches a trap 6 and recovery line 19 for trapping a precursor and returning it to the supply system, and three-way valves 26a-26d connected to supply lines 3, 10 prior to the coolers 27a, 27b and exhaust lines 3,10 after the coolers 27a, 27b for directing and controlling the flow of gas from the TMP 4 and compressor 9 to the dry pump 5 and gas separator 11. (Entire document, specifically, figures 5 and 8)

The motivation for adding the trap and recovery line of Sekine et al to the first exhaust system of Saito et al is to enable the apparatus of Saito et al to trap and recycle the unused first precursors to improve the efficiency of process and lessen the environmental impact of the process gases as taught by Sekine et al.

The motivation for replacing multiple (two) stop valves of Saito et al with a single three-way valve of Sekine et al is to provide an alternate and equivalent means of controlling the flow of gases, and to simplify the supply and exhaust systems.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the trap and recovery pipe of Sekine et al to the first exhaust system of Saito et al and to replace the stop valves of Saito et al with a three-way valve of Sekine et al as taught by Sekine et al.

9. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al, US Patent 6,383,300 B1, in view of Otsuki, US Patent Application Publication 2003/0200929 A1.

Saito et al was discussed above.

Saito et al differs from the present invention in that Saito et al does not teach $TiCl_4$ and NH_3 as the first and second precursors.

Otsuki teaches a processing system that includes a first precursor supply system 44 for supplying $TiCl_4$ and a second precursor supply system 45 for supplying NH_3 to form a barrier layer of TiN. (Figure 1)

The motivation for using $TiCl_4$ and NH_3 as the first and second precursors in the apparatus of Saito et al is to enable the apparatus of Saito et al to deposit a TiN barrier layer as taught by Otsuki.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use $TiCl_4$ and NH_3 as precursors in the apparatus of Saito et al as taught by Otsuki.

10. Claims 2, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinriki et al, WO 02/15243 A1, in view of Sekine et al, US Patent 6,334,938 B1.

Shinriki et al was discussed above.

Shinriki et al differs from the present invention in that Shinriki et al does not teach that the first exhaust system has a trap for trapping the first precursor and a recovery pipe for returning the trapped first precursor to the first supply system, or using three-way valves in the supply and exhaust systems.

Sekine et al teaches a trap 6 and recovery line 19 for trapping a precursor and returning it to the supply system, and three-way valves 26a-26d connected to supply lines 3, 10 prior to the coolers 27a, 27b and exhaust lines 3,10 after the coolers 27a, 27b for directing and controlling the flow of gas from the TMP 4 and compressor 9 to the dry pump 5 and gas separator 11. (Entire document, specifically, figures 5 and 8)

The motivation for adding the trap and recovery line of Sekine et al to the first exhaust system of Shinriki et al is to enable the apparatus of Shinriki et al to trap and recycle the unused first precursors to improve the efficiency of process and lessen the environmental impact of the process gases as taught by Sekine et al.

The motivation for replacing multiple (two) stop valves of Shinriki et al with a single three-way valve of Sekine et al is to provide an alternate and equivalent means of controlling the flow of gases, and to simplify the supply and exhaust systems.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the trap and recovery pipe of Sekine et al to the first exhaust system of Shinriki et al and to replace the stop valves of Shinriki et al with a three-way valve of Sekine et al as taught by Sekine et al.

11. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinriki et al, WO 02/15243 A1, in view of Otsuki, US Patent Application Publication 2003/0200929 A1.

Shinriki et al was discussed above.

Shinriki et al differs from the present invention in that Shinriki et al does not teach $TiCl_4$ and NH_3 as the first and second precursors.

Otsuki teaches a processing system that includes a first precursor supply system 44 for supplying $TiCl_4$ and a second precursor supply system 45 for supplying NH_3 to form a barrier layer of TiN. (Figure 1)

The motivation for using $TiCl_4$ and NH_3 as the first and second precursors in the apparatus of Shinriki et al is to enable the apparatus of Shinriki et al to deposit a TiN barrier layer as taught by Otsuki.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use $TiCl_4$ and NH_3 as precursors in the apparatus of Shinriki et al as taught by Otsuki.

Response to Arguments

12. Applicant's arguments filed December 15, 2005 have been fully considered but they are not persuasive.

In regard to the arguments that Yamaga et al and Saito et al fail to teach "an atomic layer deposition apparatus", the Examiner disagrees. The claims require a "processing apparatus for performing atomic layer deposition", which is an intended use of the apparatus. Atomic layer deposition is a type of CVD and can be performed by any CVD apparatus that includes two gas sources. The apparatus of Yamaga et al and Saito et al are CVD apparatus and have all the required structure (i.e. gas supply systems, valves etc) to perform atomic layer deposition, and differ only in the specific gas supplied to the apparatus. The specific gas supplied to the apparatus is a process limitation and does not affect the structure of the apparatus. Furthermore, it has been held that: claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danley*, 120 USPQ 528, 531, (CCPQ 1959); "Apparatus claims cover what a device is, not what a device does" (Emphasis in original) *Hewlett-Packard Co. V. Bausch & Lomb Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990); and a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus " if the prior art apparatus teaches all the structural limitations of the claim *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Also see MPEP 2114

In regard to the argument that "conductance valves that can restrict the flow of gas, but which do not completely stop the gas flow", the Examiner disagrees. Conductance valves can be used to completely stop the gas flow as taught by Shinriki et al i.e. the conductance valve can be "completely shut" (column 5 line 65), or in US Patent 6,227,236 B1 to Kusumoto et al which teaches a conductance valve with a sealing surface 6.

In regard to the argument that Shinriki et al teaches, "one exhaust volume adjustment valve is set to "wide open", the other exhaust volume adjustment valve is set to a small opening "rather than completely shut", the Examiner disagrees. First, Shinriki et al specifically teaches "it is desirable that the second exhaust volume adjustment valve 6B be set to a small opening of 3% or less, for example, rather than completely shut in view of valve opening-and-closing operation at a high temperature" (Column 5 lines 62-66). Thus, Shinriki et al teaches closing the valve, and a degree of closing that includes a range of openings for the valve of 3% or less. The limitation "3% or less" includes completely shut. Second, "close" is a broad term and is not limited to "completely shut". For example, Shinriki et al considers 3% or less to be closed i.e. "in view of valve opening-and-closing operation". Furthermore, the claim language only requires that the controller close the first and second exhaust systems. The claims do not require that the exhaust system be "completely shut".

The argument that "the apparatus of Shinriki cannot prevent a first gas source from mixing with a second gas source within the processing container or exhaust line" is moot because the limitation is not claimed.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art teaches the technological background of the invention.

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (6:30 am-6:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jeffrie R. Lund
Primary Examiner
Art Unit 1763

JRL
3/5/06